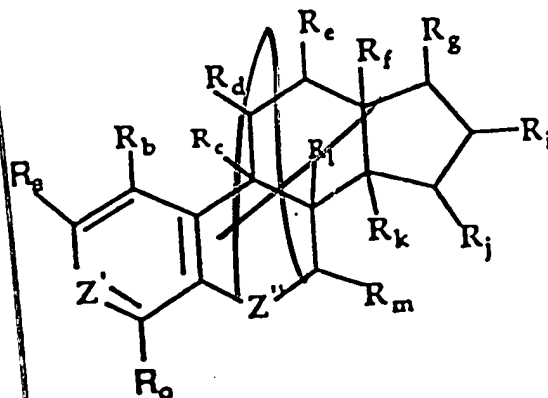


Claims

- 1           1. A method for treating a mammalian disease  
2 characterized by abnormal cell mitosis, said method  
3 comprising administering to a mammal a cell-mitosis-  
4 inhibiting compound of the formula below, said compound  
5 being administered in an amount sufficient to inhibit cell  
6 mitosis:

7



8   wherein:

- 9       I.  $R_a-R_o$  are defined as follows:  
10           A) each  $R_a, R_b, R_c, R_d, R_e, R_f, R_i, R_j, R_k, R_l,$   
11              $R_m, R_o$ , independently is  $-R_1, -OR_1,$

12  $-\text{OCOR}_1$ ,  $-\text{SR}_1$ ,  $-\text{F}$ ,  $-\text{NHR}_2$ ,  $-\text{Br}$ , or  $-\text{I}$ ; and  $\text{R}_g$   
 13 is  $-\text{R}_1$ ,  $-\text{OR}_1$ ,  $-\text{OCOR}_1$ ,  $-\text{SR}_1$ ,  $-\text{F}$ ,  $-\text{NHR}_2$ ,  $-\text{Br}$ ,  
 14  $-\text{I}$ , or  $-\text{C}\equiv\text{CH}$ ;

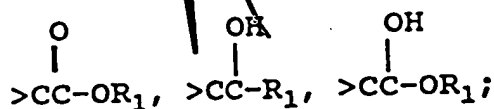
15 or

16 B) each  $\text{R}_a$ ,  $\text{R}_b$ ,  $\text{R}_c$ ,  $\text{R}_f$ ,  $\text{R}_k$ ,  $\text{R}_l$ ,  $\text{R}_o$ ,  
 17 independently is  $-\text{R}_1$ ,  $-\text{OR}_1$ ,  $-\text{OCOR}_1$ ,  $-\text{SR}_1$ ,  
 18  $-\text{F}$ ,  $-\text{NHR}_2$ ,  $-\text{Br}$ , or  $-\text{I}$ ; and each  $\text{R}_d$ ,  $\text{R}_e$ ,  $\text{R}_i$ ,  
 19  $\text{R}_j$ ,  $\text{R}_m$ , independently is  $=\text{O}$ ,  $-\text{R}_1$ ,  $-\text{OR}_1$ ,  
 20  $-\text{OCOR}_1$ ,  $-\text{SR}_1$ ,  $-\text{F}$ ,  $-\text{NHR}_2$ ,  $-\text{Br}$  or  $-\text{I}$ ; and  $\text{R}_g$   
 21 is  $=\text{O}$ ,  $-\text{R}_1$ ,  $-\text{OR}_1$ ,  $-\text{OCOR}_1$ ,  $-\text{SR}_1$ ,  $-\text{F}$ ,  $-\text{NHR}_2$ ,  
 22  $-\text{Br}$ ,  $-\text{I}$ , or  $-\text{C}\equiv\text{CH}$ ;

23 and

24 II.  $\text{Z}'$  is defined as follows:

25 A)  $\text{Z}'$  is  $\text{X}$ , where  $\text{X}$  is  $>\text{COR}_1$ ,  $>\overset{\text{O}}{\text{CC}}-\text{R}_1$ ,  
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 27



31 or

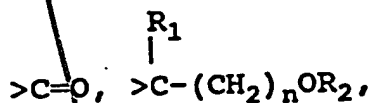
32 B)  $\text{Z}'$  is  $=\underset{\text{R}_n}{\text{C}}-\text{X}'$  or  $-\text{X}'-\underset{\text{R}_n}{\text{C}}=$ , where  $\text{R}_n$   
 33  
 34

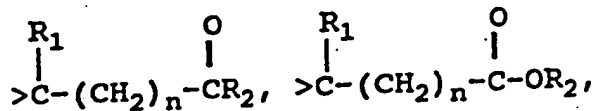
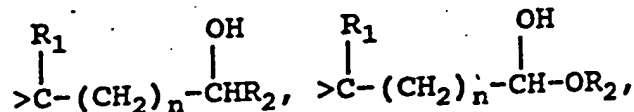
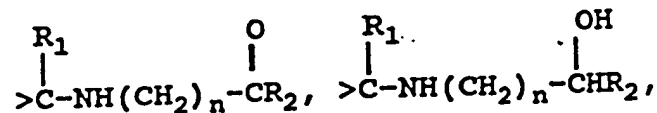
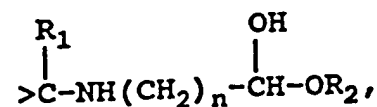
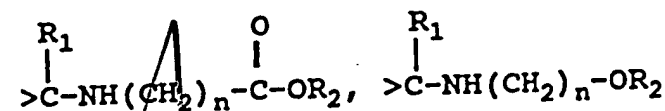
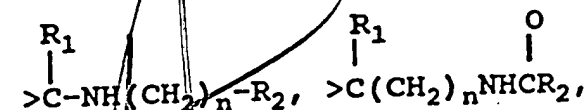
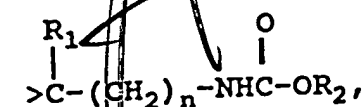
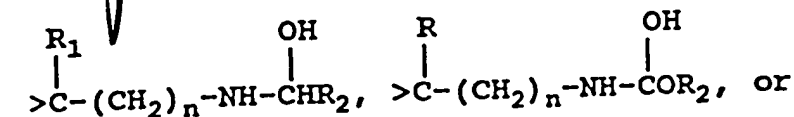
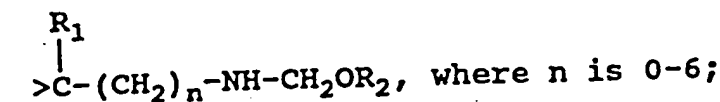
35 is  $-\text{R}_1$ ,  $-\text{OR}_1$ ,  $-\text{SR}_1$ ,  $-\text{F}$ ,  $-\text{NHR}_2$ ,  $-\text{Br}$  or  $-\text{I}$ ;  
 36 and  $\text{X}'$  is  $\text{X}$ , as defined above; or  $\text{X}'$  is  
 37  $>\text{C}=\text{O}$ ;

38 and

39 III.  $\text{Z}''$  is defined as follows:

40 A)  $\text{Z}''$  is  $\text{Y}$ , where  $\text{Y}$  is  $-\text{O}-$ ,  $-\text{N}-$ ,  $>\overset{\text{R}_1}{\text{CHR}}_1$ ,  
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73 or

74  
75  
76

B)  $Z''$  is  $-Y-CH-$  or  $-CH-Y-$  where  $R_p$

$$\begin{array}{c} | \quad \quad | \\ R_p \quad R_p \end{array}$$

77

is  $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$  or  $-I$ ;

78 and

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IV. provided that when each  $R_b, R_c, R_d, R_e, R_i, R_j, R_k,$

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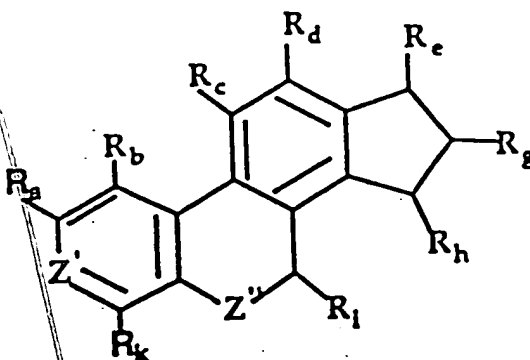
$R_l, R_m$  and  $R_o$  is H;

81

$R_f$  is  $-CH_3$ ;

82  $R_g$  is  $-OH$ ;  
83  $Z'$  is  $>COH$ ; and  
84  $Z''$  is  $>CH_2$ ;  
85 then  $R_a$  is not  $-H$ ;  
86 where, in each formula set forth above, each  $R_1$  and  $R_2$   
87 independently is  $-H$ , or substituted or unsubstituted alkyl,  
88 alkenyl or alkynyl group of 1-6 carbons.

1 2. A method for treating a mammalian disease  
2 characterized by abnormal cell mitosis, said method  
3 comprising administering to a mammal a cell-mitosis-  
4 inhibiting compound of the formula below, said compound  
5 being administered in an amount sufficient to inhibit cell  
6 mitosis:



8 wherein:

9 I.  $R_a-R_k$  are defined as follows:

10 A) each  $R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k$   
11 independently is  $-R_1, -OR_1, -OCOR_1, -SR_1,$   
12  $-F, -NHR_2, -Br, \text{ or } -I$ ; and  $R_e$  is  $-R_1, -OR_1,$   
13  $-OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$  or  $-C\equiv CH$ ;

14 or

15 B) each  $R_a, R_b, R_c, R_d, R_k$ , independently is  
16  $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, \text{ or }$   
17  $-I$ ; and each  $R_e, R_g, R_h, R_i$ , independently is  
18  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -Br, \text{ or }$   
19  $-I$ ; and  $R_e$  is  $=O, -R_1, -OR_1, -OCOR_1, -SR_1,$   
20  $-F, -Br, -I$  or  $-C\equiv CH$ ;

21 and

22 II.  $Z'$  is defined as follows:

23 A)  $Z'$  is  $X$ , where  $X$  is  $>COR_1, >CC-R_1,$   
24  
25

26  $\begin{array}{c} O \\ | \\ >CC-OR_1 \end{array}, \begin{array}{c} OH \\ | \\ >CC-R_1 \end{array}, \begin{array}{c} OH \\ | \\ >C-C-OR_1 \end{array};$   
27  
28

29 or

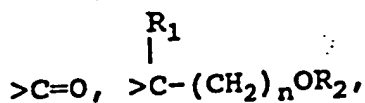
30 B)  $Z'$  is  $\begin{array}{c} & & O \\ & & | \\ =C-X' & - & -X'-C= \end{array}$ , where  $R_n$   
31  $\begin{array}{c} R_n \\ | \end{array}$   $\begin{array}{c} R_n \\ | \end{array}$   
32  
33 is  $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$  or  $-I$ ,  
34 and  $X'$  is  $X$ , as defined above;  
35 or  $X'$  is also  $>C=O$ ;

36 and

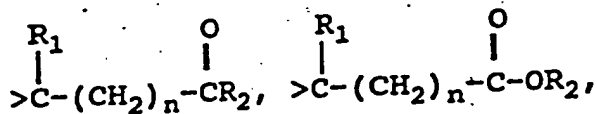
37 III.  $Z''$  is defined as follows:

38 A)  $Z''$  is  $Y$ , where  $Y$  is  $-O-, -N-, >\overset{R_1}{C}HR_1,$   
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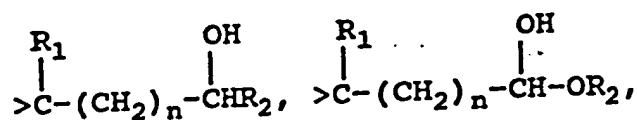
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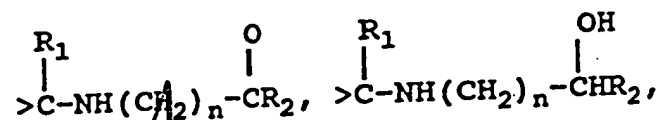
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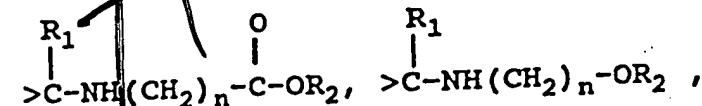
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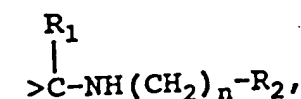
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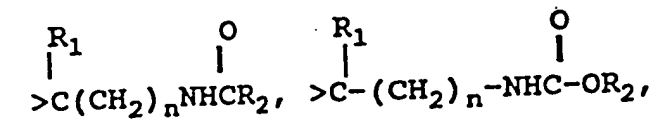
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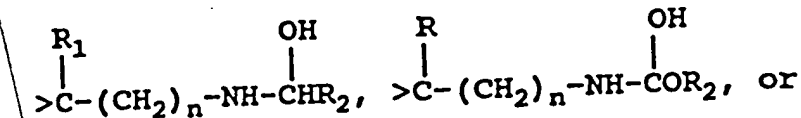
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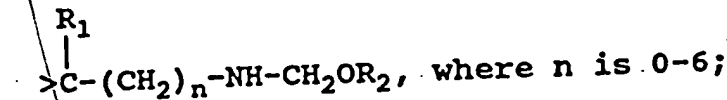
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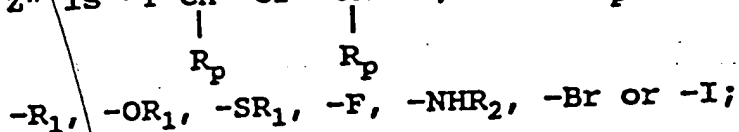


71 or

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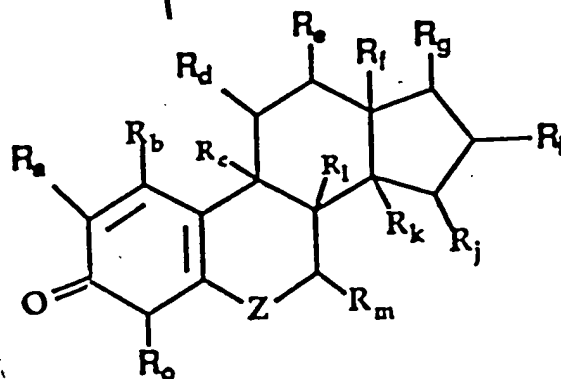
B) Z" is -Y-CH- or -CH-Y-, where R<sub>p</sub> is

75



76 where, in each formula set forth above, each  $R_1$  and  $R_2$   
77 independently is -H, or substituted or unsubstituted alkyl,  
78 alkenyl or alkynyl group of 1-6 carbons.

1 3. A method for treating a mammalian disease  
2 characterized by abnormal cell mitosis, said method  
3 comprising administering to a mammal a cell-mitosis-  
4 inhibiting compound of the formula below, said compound  
5 being administered in an amount sufficient to inhibit cell  
6 mitosis:



8 wherein:

9 I.  $R_a$ - $R_o$  are defined as follows:  
10 A) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_e$ ,  $R_f$ ,  $R_i$ ,  $R_j$ ,  $R_k$ ,  $R_l$ ,  
11  $R_m$ ,  $R_o$  independently is - $R_1$ , - $OR_1$ , - $OCOR_1$ ,  
12 - $SR_1$ , -F, - $NHR_2$ , -Br, or -I; and  $R_g$  is - $R_1$ ,  
13 - $OR_1$ , - $OCOR_1$ , - $SR_1$ , -F, - $NHR_2$ , -Br, -I or  
14 - $C\equiv CH$ ;

15 or

16

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23 and

24 II.

Z is defined as follows:

25

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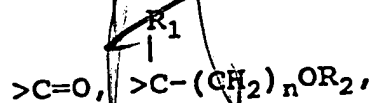
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A) Z is Y, where Y is  $-O-$ ,  $-N-\overset{R_1}{|}$ ,  $>CHR_1$ ,

28

29

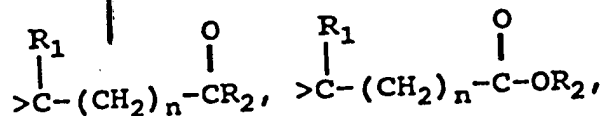
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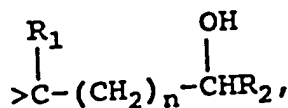
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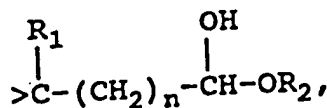
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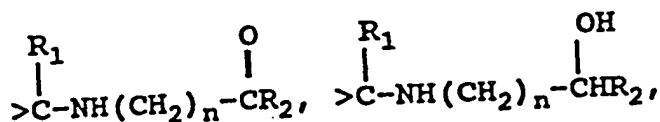
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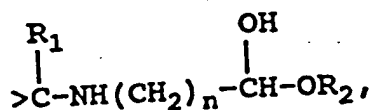
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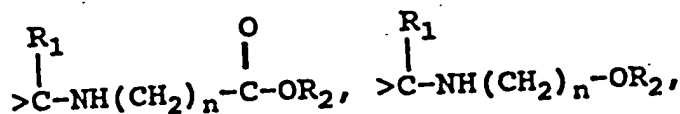
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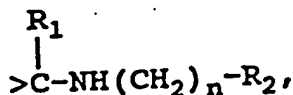
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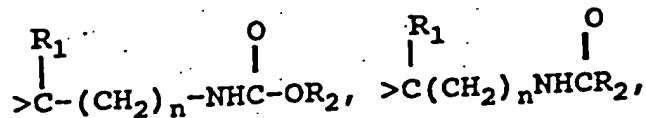




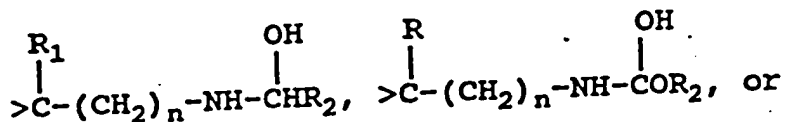
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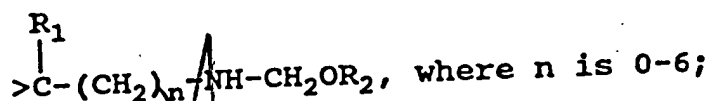
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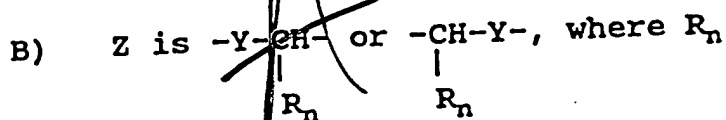


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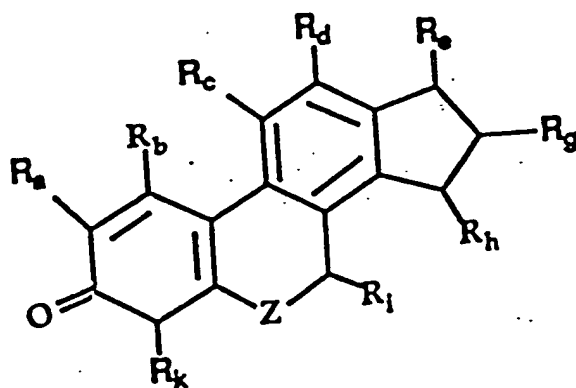
62 or

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66 is  $-R_1$ ,  $-OR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$  or  $-I$ ;  
67 where, in each formula set forth above, each  $R_1$  and  $R_2$   
68 independently is  $-H$ , or substituted or unsubstituted alkyl,  
69 alkenyl or alkynyl group of 1-6 carbons.

1 4. A method for treating a mammalian disease  
2 characterized by abnormal cell mitosis, said method  
3 comprising administering to a mammal a cell-mitosis-  
4 inhibiting compound of the formula below, said compound  
5 being administered in an amount sufficient to inhibit cell  
6 mitosis:



7 wherein:

8 I.  $R_a-R_k$  are defined as follows:

9 A) each  $R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k$   
 10 independently is  $-R_1, -OR_1, -OCOR_1, -SR_1,$   
 11  $-F, -NHR_1, -Br, \text{ or } -I$ ; and  $R_e$  is  $-R_1, -OR_1,$   
 12  $-OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$  or  $-C\equiv CH$ ;

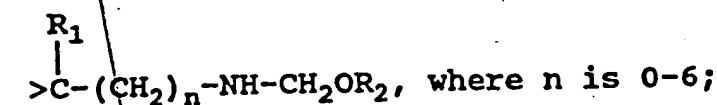
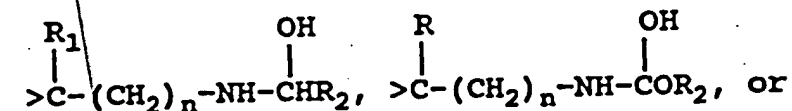
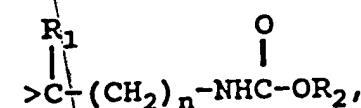
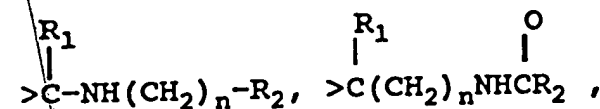
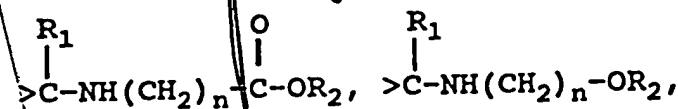
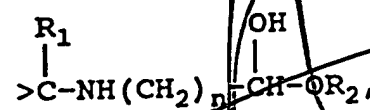
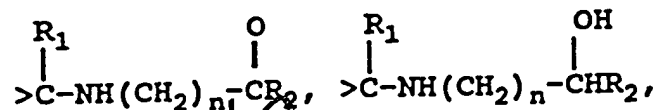
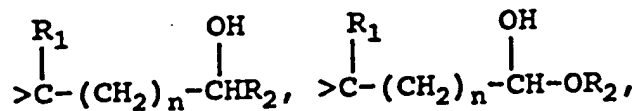
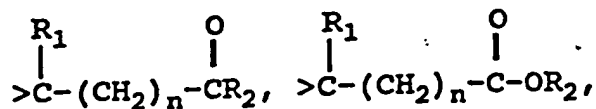
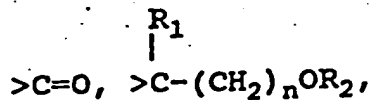
13 or

14 B) each  $R_a, R_b, R_c, R_d$  independently is  $-R_1,$   
 15  $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, \text{ or } -I$   
 16 and each  $R_g, R_h, R_i, R_k$  independently is  
 17  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$   
 18 or  $-I$ ; and  $R_e$  is  $=O, -R_1, -OR_1, -OCOR_1,$   
 19  $-SR_1, -F, -NHR_1, -Br, -I$  or  $-C\equiv CH$ ;

20 and

21 II.  $Z$  is defined as follows:

22  
23  
24 A) Z is Y, where Y is  $\text{-O-}$ ,  $\text{-N-}$ ,  $\text{>CHR}_1$ ,

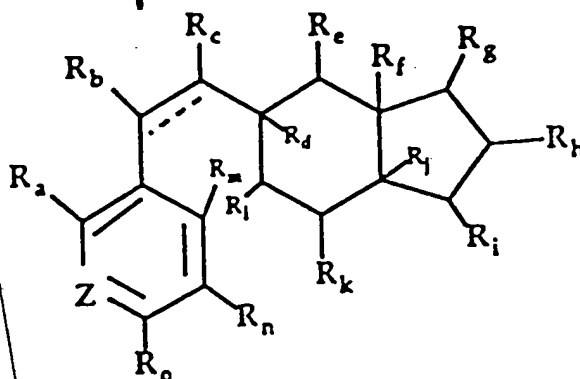


55 or

56 B) Z is  $\text{-Y-CH-}$  or  $\text{-CH-Y-}$ , where  $\text{R}_n$   
57  
58

59 is  $-R_1$ ,  $-OR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$  or  $-I$ ;  
60 where, in each formula set forth above, each  $R_1$  and  $R_2$   
61 independently is  $-H$ , or substituted or unsubstituted alkyl,  
62 alkenyl or alkynyl group of 1-6 carbons.

1 5. A method for treating a mammalian disease  
2 characterized by abnormal cell mitosis, said method  
3 comprising administering to a mammal a cell-mitosis-  
4 inhibiting compound of the formula below, said compound  
5 being administered in an amount sufficient to inhibit cell  
6 mitosis:  
7



15 or

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23 or

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B) each  $R_a, R_d, R_f, R_j, R_m, R_n, R_o$  independently is  $-R_1, -OR_1, -OCR_1, -SR_1, -F, -NHR_2, -Br, \text{ or } -I$ ; and each  $R_b, R_c, R_e, R_g, R_h, R_k, R_l$  independently is  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$  or  $-I$ ; and  $R_i$  is  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -Br, -I$  or  $-C\equiv CH$ ;

23 or

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C) each  $R_a, R_b, R_c, R_d, R_f, R_j, R_m, R_n, R_o$  independently is  $-R_1, -OR_1, -OCR_1, -SR_1, -F, -NHR_2, -Br, -I$  and each  $R_e, R_g, R_h, R_k, R_l$  independently is  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$  or  $-I$ ; and  $R_i$  is  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -Br, -I$  or  $-C\equiv CH$ ;

31

II. Z is defined as follows:

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34

A) Z is X, where X is  $\begin{array}{c} O \\ | \\ >COR_1 \end{array}, \begin{array}{c} O \\ | \\ >CC-R_1 \end{array}, \begin{array}{c} O \\ | \\ >CC-OR_1 \end{array},$

35

36

37

$\begin{array}{c} OH \\ | \\ >CC-R_1 \end{array}, \begin{array}{c} OH \\ | \\ >CC-OR_1 \end{array};$

38 or

39  
40  
41

B) Z is  $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_p \end{array}$  or  $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_p \end{array}$ , where  $\text{R}_p$

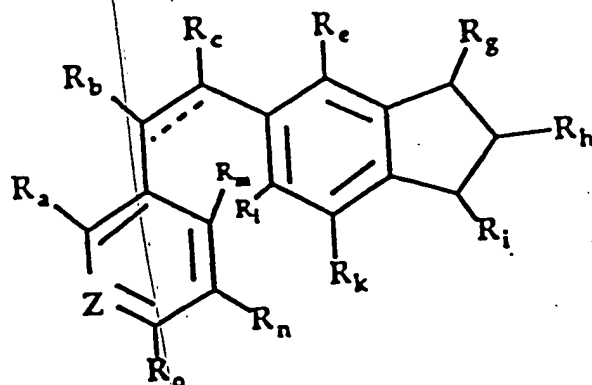
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is  $-\text{R}_1$ ,  $-\text{OR}_1$ ,  $-\text{SR}_1$ ,  $-\text{F}$ ,  $-\text{NHR}_2$ ,  $-\text{Br}$  or  $-\text{I}$ ;  
and  $\text{X}'$  is  $\text{X}$ , as defined above;  
or  $\text{X}'$  is  $>\text{C}=\text{O}$ ;

45 where, in each formula set forth above, each  $\text{R}_1$  and  $\text{R}_2$   
46 independently is  $-\text{H}$ , or substituted or unsubstituted alkyl,  
47 alkenyl or alkynyl group of 1-6 carbons; and the bond  
48 indicated by  $\text{C}\cdots\text{C}$  is absent or, in combination with the  $\text{C}-\text{C}$   
49 bond, is the unit  $\text{HC}=\text{CH}$ .

1 6. A method for treating a mammalian disease  
2 characterized by abnormal cell mitosis, said method  
3 comprising administering to a mammal a cell-mitosis-  
4 inhibiting compound of the formula below, said compound  
5 being administered in an amount sufficient to inhibit cell  
6 mitosis:

7



8 wherein:

9 I.  $R_a-R_o$  are defined as follows:

10 A) each  $R_a, R_b, R_c, R_e, R_g, R_h, R_k, R_l, R_m, R_n,$   
 11  $R_o$  independently is  $-R_1, -OR_1, -OCOR_1,$   
 12  $-SR_1, -F, -NHR_2, -Br, \text{ or } -I$ ; and  $R_1$  is  $-R_1,$   
 13  $-OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$  or  
 14  $-C\equiv CH$ ;

15 or

16 B) each  $R_a, R_e, R_l, R_m, R_n, R_o$  independently  
 17 is  $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$   
 18  $-I$  and each  $R_b, R_c, R_g, R_h$  is  $=O, -R_1,$   
 19  $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$  or  $-I$ ;  
 20 and  $R_1$  is  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F,$   
 21  $-NHR_1, -Br, -I$  or  $-C\equiv CH$ ;

22 or

23 C) each  $R_a, R_b, R_c, R_e, R_k, R_m, R_n, R_o$   
 24 independently is  $-R_1, -OR_1, -OCOR_1, -SR_1,$   
 25  $-F, -NHR_2, -Br, -I$ , and each  $R_h, R_l$   
 26 independently is  $=O, -R_1, -OR_1, -OCOR_1,$   
 27  $-SR_1, -F, -NHR_1, -Br$  or  $-I$ ; and  $R_1$  is  $=O,$   
 28  $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$   
 29 or  $-C\equiv CH$ ;

30 and

31 I.  $Z$  is defined as follows:

32 A)  $Z$  is  $X$ , where  $X$  is  $>COR_1, >\overset{O}{\underset{|}{CC}}-R_1, >\overset{O}{\underset{|}{CC}}-OR_1,$   
 33  
 34

35  $\overset{OH}{\underset{|}{>CC}}-R_1, \overset{OH}{\underset{|}{>CC}}-OR;$   
 36  
 37

38 or

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B) Z is  $\begin{array}{c} \text{=C-X'-} \\ | \\ R_p \end{array}$  or  $\begin{array}{c} \text{-X'-C=} \\ | \\ R_p \end{array}$ , where  $R_p$

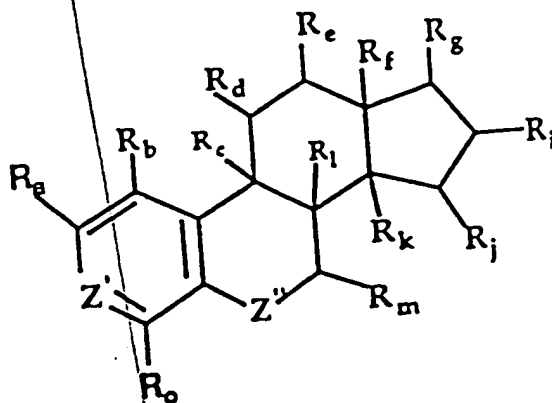
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is  $-R_1$ ,  $-OR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$  or  $-I$ ,  
and  $X'$  is  $X$ , as defined above;  
or  $X'$  is  $=O$ ;

45 where, in each formula set forth above, each  $R_1$  and  $R_2$   
46 independently is  $-H$ , or substituted or unsubstituted alkyl,  
47 alkenyl or alkynyl group of 1-6 carbons; and the bond  
48 indicated by  $C \cdots C$  is absent or, in combination with the  $C-C$   
49 bond is the unit  $HC=CH$ .

1  
2  
3

7. A compound of the general formula below, said  
compound being a cell-mitosis-inhibiting compound:





4 wherein:

5 I.  $R_a-R_o$  are defined as follows:

6 (A) each  $R_a, R_b, R_c, R_d, R_e, R_f, R_i, R_j, R_k, R_l,$   
7  $R_m, R_o$ , independently is  $-R_1, -OR_1,$   
8  $-OCOR_1, -SR_1, -F, -NHR_2, -Br$ , or  $-I$ ; and  $R_g$   
9 is  $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$   
10  $-I$  or  $-C\equiv CH$ ;

11 or

12 (B) each  $R_a, R_b, R_c, R_f, R_k, R_l, R_o$ , is  $-R_1,$   
13  $-OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br$ , or  $-I$ ;  
14 and each  $R_d, R_e, R_i, R_j, R_m$ , independently  
15 is  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2,$   
16  $-Br$  or  $-I$ ; and  $R_g$  is  $=O, -R_1, -OR_1, -OCOR_1,$   
17  $-SR_1, -F, -NHR_2, -Br, -I$  or  $-C\equiv CH$ ;

18 and

19 II.  $Z'$  is defined as follows:

20  
21 A)  $Z'$  is X, where X is  $\overset{O}{\parallel} >COR_1, \overset{O}{\parallel} >CC-R_1,$   
22

23  
24  $\overset{O}{\parallel} >CC-OR_1, \overset{OH}{\parallel} >CC-R_1, \overset{OH}{\parallel} >CC-OR_1;$   
25

26 or

27 B)  $Z'$  is  $\begin{array}{c} =C-X' \\ | \\ R_n \end{array}$  or  $\begin{array}{c} -X'-C= \\ | \\ R_n \end{array}$ , where  $R_n$   
28  
29

30 is  $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$  or  $-I$ ;  
31 or  $X'$  is X, as defined above; or  
32  $X'$  is  $>C=O$ ;

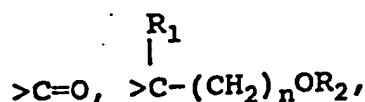
33 and

34 III.  $Z''$  is defined as follows:

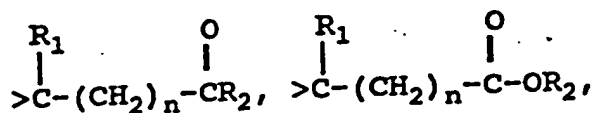
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A)  $z''$  is Y, where Y is  $-O-$ ,  $-N-$ ,  $>CHR_1$ ,

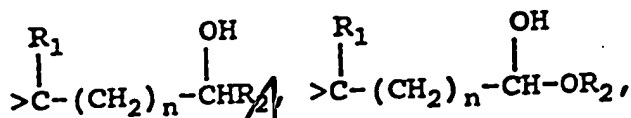
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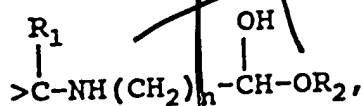
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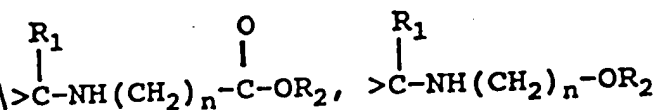
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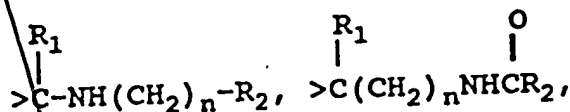
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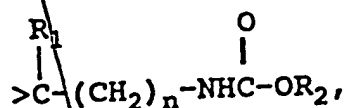
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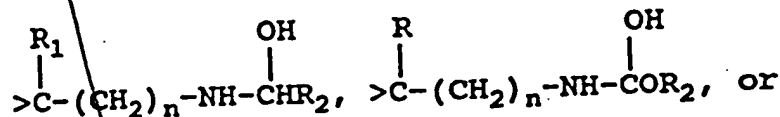
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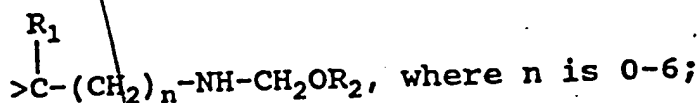
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68 or

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B)  $z''$  is  $-Y-CH-$  or  $-CH-Y-$  where  $R_p$

72 is  $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$  or  $-I$ ;

73 provided that when:

74 3) each  $R_b, R_c, R_d, R_e, R_j, R_k, R_l, R_m$  is  $-H$ ;  
75  $R_f$  is  $-CH_3$ ;

76  $R_g$  is  $-OH, -OCCH_3$ ;  
77  $R_i$  is  $-H, -OH$ , or  $=O$ ;

78  $R_o$  is  $-H$  or  $-Br$ ;

79  $Z'$  is  $>COH$ ; and

80  $Z''$  is  $>CH_2$  or  $-OH$ ; then  
81  $R_a$  is not  $-F, -Br, -OH$  or  $-H$ ;

82 and

83 and

84 4) each  $R_b, R_c, R_d, R_e, R_i, R_j, R_k, R_l,$   
85  $R_m$  is  $-H$ ;

86  $R_f$  is  $-CH_3$ ;

87  $R_g$  is  $-OH$ ; and

88  $Z''$  is  $>CH_2$ ; then

89  $Z'$  is not  $>COCH_3$  or  $>COCCH_3$ ; and  
90 each  $R_a, R_o$  independently or together are  
91 not  $-OCH_3$  or  $-H$ ;

92 and

93 5) each  $R_c, R_e, R_j, R_k, R_l, R_m, R_o$  is  $-H$ ;

94  $R_a$  is  $-H$  or  $-OCH_3$ ;

95  $R_b$  is  $-H$  or  $-CH_3$ ;

96  $R_d$  is  $-OH$ ;

97  $R_f$  is  $-CH_3$ ;

98  $R_g$  is  $=O$ ;

99  $R_i$  is  $-OH, =O$  or  $-C\equiv CH$ ; and

100  $Z''$  is  $>CH_2$ ; then

101  $Z'$  is not  $>COH, >COCCH_3$ , or  $-H$ ;

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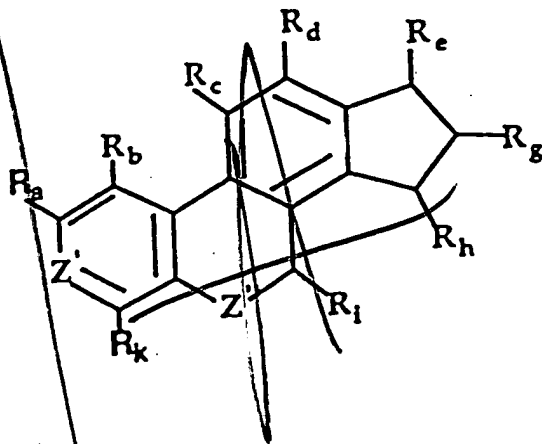
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106

107 where, in each formula set forth above, each  $R_1$  and  $R_2$   
108 independently is -H, or substituted or unsubstituted alkyl,  
109 alkenyl or alkynyl group of 1-6 carbons.

1 8. A compound of the general formula below, said  
2 compound being a cell-mitosis-inhibiting compound:

3



4 wherein:

5 I.  $R_a$ - $R_k$  are defined as follows:

6 A) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_g$ ,  $R_h$ ,  $R_i$ ,  $R_k$   
7 independently is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  
8  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and  $R_e$  is  $-R_1$ ,  $-OR_1$ ,  
9  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  $-I$  or  $-C\equiv CH$ ;

10 or

11 B) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_k$ , is  $-R_1$ ,  $-OR_1$ ,  
12  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and  
13 each  $R_g$ ,  $R_h$ ,  $R_i$ , independently is  $=O$ ,

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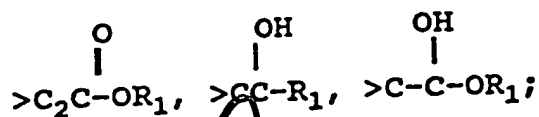
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$-R_1, -OR_1, -OCOR_1, -SR_1, -F, -Br, \text{ or } -I;$   
and  $R_e$  is  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F,$   
 $-Br, -I$  or  $-C\equiv CH;$

and

I.  $Z'$  is defined as follows:

A)  $Z'$  is  $X$ , where  $X$  is  $>COR_1, >C_2C-R_1,$



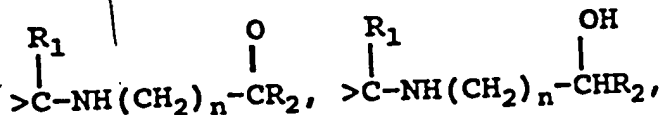
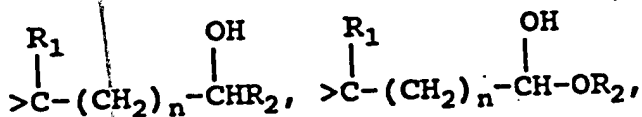
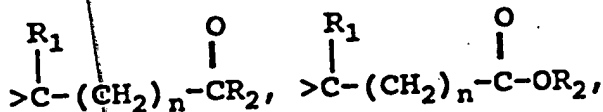
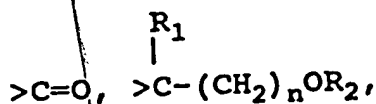
or

B)  $Z'$  is  $=C-X'-$  or  $-X'-C=$ , where  $R_n$   
is  $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$  or  $-I,$   
and  $X'$  is  $X$ , as defined above;  
or  $X'$  is also  $>C=O;$

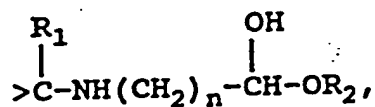
and

II.  $Z''$  is defined as follows:

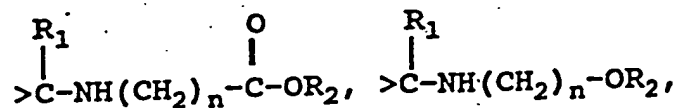
A)  $Z''$  is  $Y$ , where  $Y$  is  $-O-, -N-, >CHR_1,$



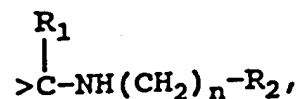
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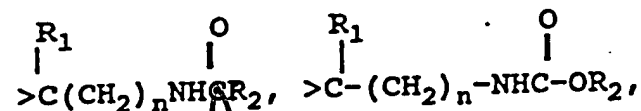
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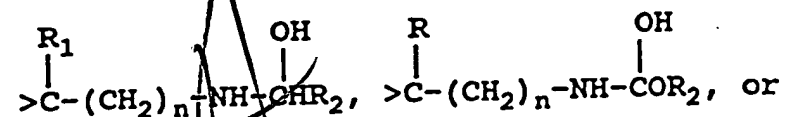
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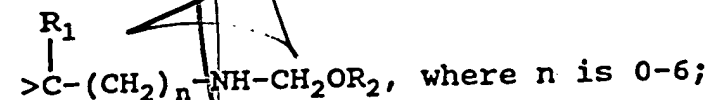
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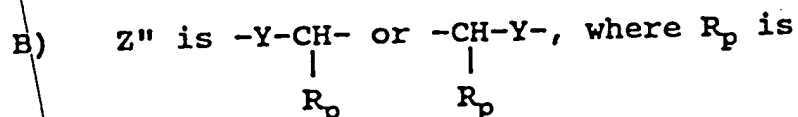


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67 or

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$$-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br \text{ or } -I;$$

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where, in each formula set forth above, each  $R_1$  and  $R_2$

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independently is -H, or substituted or unsubstituted alkyl,

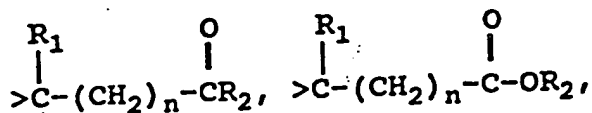
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alkenyl or alkynyl group of 1-6 carbons.

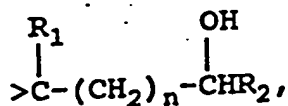
1           9. A compound of the general formula below, said  
2 compound being a cell-mitosis-inhibiting compound:



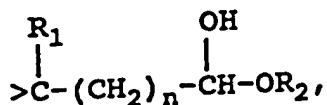
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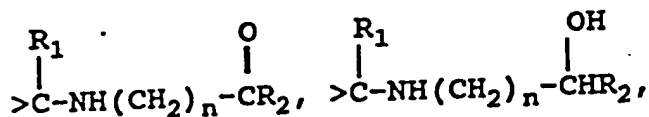
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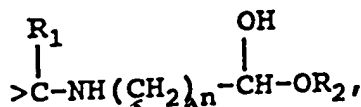
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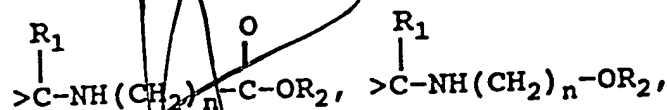
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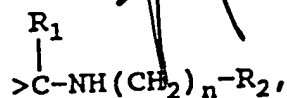
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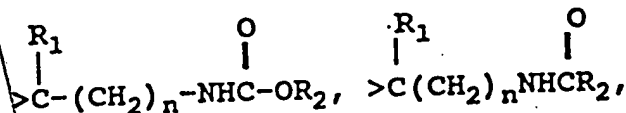
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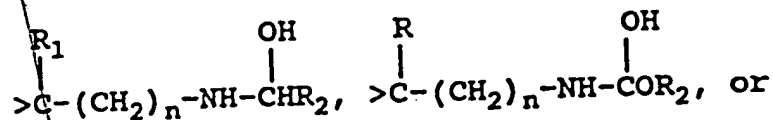
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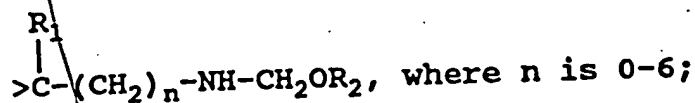
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57 or

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B) Z is  $\begin{array}{c} -Y-CH- \\ | \\ R_n \end{array}$  or  $\begin{array}{c} -CH-Y- \\ | \\ R_n \end{array}$ , where  $R_n$

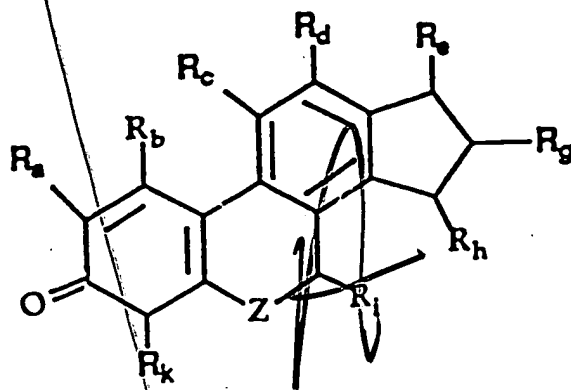
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is  $-R_1$ ,  $-OR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$  or  $-I$ ;



62 where, in each formula set forth above, each  $R_1$  and  $R_2$   
63 independently is -H, or substituted or unsubstituted alkyl,  
64 alkenyl or alkynyl group of 1-6 carbons.

1 10. A compound of the general formula below, said  
2 compound being a cell-mitosis-inhibiting compound:



4 wherein:

5 I.  $R_a$ - $R_k$  are defined as follows:

6 A) each  $R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k$   
7 independently is  $-R_1, -OR_1, -OCOR_1, -SR_1,$   
8  $-F, -NHR_1, -Br, \text{ or } -I$ ; and  $R_e$  is  $-R_1, -OR_1,$   
9  $-OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$  or  $-C\equiv CH$ ;

10 or

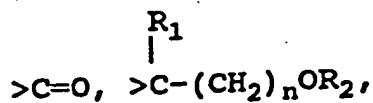
11 B) each  $R_a, R_b, R_c, R_d$ , independently is  $-R_1,$   
12  $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, \text{ or } -I$ ;  
13 and each  $R_g, R_h, R_i, R_k$  independently is  
14  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$   
15 or  $-I$ ; and  $R_e$  is  $-R_1, -OR_1, -OCOR_1, -SR_1,$   
16  $-F, -NHR_1, -Br, -I$  or  $-C\equiv CH$ ;

17 II.  $Z$  is defined as follows:

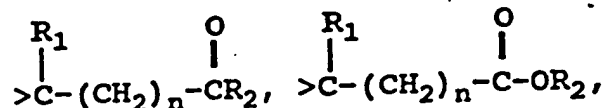
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1)  $Z$  is  $Y$ , where  $Y$  is  $-O-$ ,  $-N-$ ,  $>CHR_1$ ,

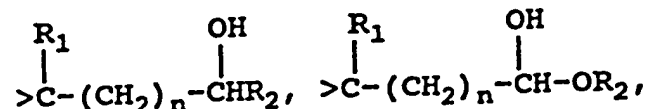
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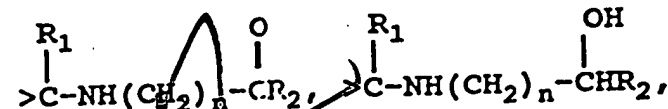
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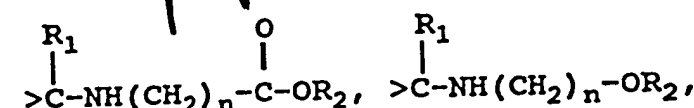
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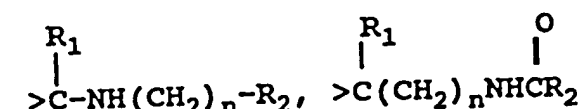
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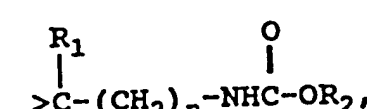
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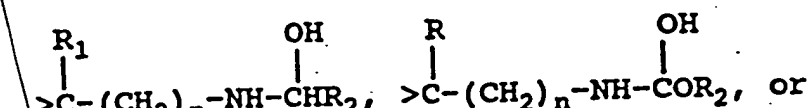
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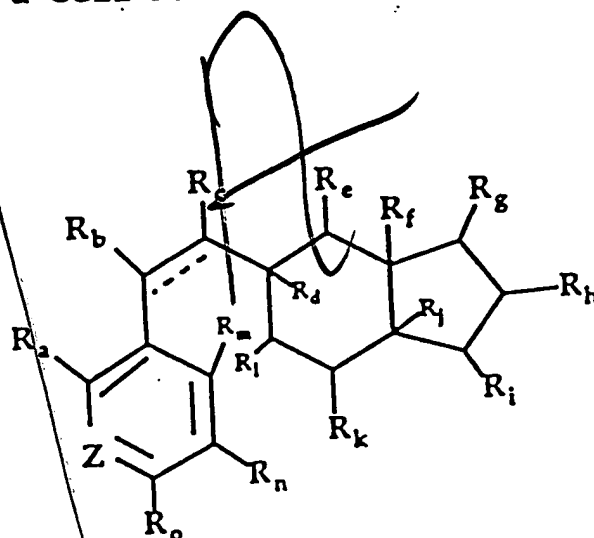
51 or

52 Z is  $-Y-CH-$  or  $-CH-Y-$ , where  $R_n$   
 53  $\begin{array}{c} | \\ R_n \end{array}$   $\begin{array}{c} | \\ R_n \end{array}$   
 54

55 is  $-R_1$ ,  $-OR_1$ ,  $-SR_1$ ,  $-F$ ,  
 56  $-NHR_2$ ,  $-Br$  or  $-I$ ;

57 where, in each formula set forth above, each  $R_1$  and  $R_2$   
 58 independently is  $-H$ , or substituted or unsubstituted alkyl,  
 59 alkenyl or alkynyl group of 1-6 carbons.

1 11. A compound of the general formula below, said  
 2 compound being a cell-mitosis-inhibiting compound:



4 wherein:

5 I.  $R_a-R_o$  are defined as follows:

6 A) each  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$ ,  $R_e$ ,  $R_f$ ,  $R_g$ ,  $R_h$ ,  $R_j$ ,  $R_k$ ,  
 7  $R_l$ ,  $R_m$ ,  $R_n$ ,  $R_o$  independently is  $-R_1$ ,  $-OR_1$ ,  
 8  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ , or  $-I$ ; and  $R_i$   
 9 is  $-R_1$ ,  $-OR_1$ ,  $-OCOR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$ ,  
 10  $-I$  or  $-C\equiv CH$ ;

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19 or

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B) each  $R_a, R_d, R_f, R_j, R_m, R_n, R_o$  independently is  $-R_1, -OR_1, -OCR_1, -SR_1, -F, -NHR_2, -Br, -I$ ; and each  $R_b, R_c, R_e, R_g, R_h, R_k, R_l$  independently is  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$  or  $-I$ ; and  $R_i$  is  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$  or  $-C\equiv CH$ ;

C) each  $R_a, R_b, R_c, R_d, R_f, R_j, R_m, R_n, R_o$  independently is  $-R_1, -OR_1, -OCR_1, -SR_1, -F, -NHR_2, -Br, -I$ ; and each  $R_e, R_g, R_h, R_k, R_l$  independently is  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$  or  $-I$ ; and  $R_i$  is  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$  or  $-C\equiv CH$ ;

27 and

28 I. Z is defined as follows:

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1) Z is X, where X is  $>COR_1, \overset{O}{\underset{|}{>CC-R_1}}, \overset{O}{\underset{|}{>CC-OR_1}},$

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$\overset{OH}{\underset{|}{>CC-R_1}}, \overset{OH}{\underset{|}{>CC-OR}}; \text{ or}$

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Z is  $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_p \end{array}$  or  $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_p \end{array}$ , where  $\text{R}_p$

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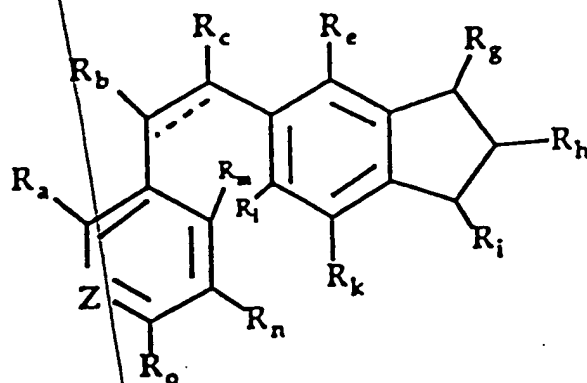
is  $-\text{R}_1$ ,  $-\text{OR}_1$ ,  $-\text{SR}_1$ ,  $-\text{F}$ ,  $-\text{NHR}_2$ ,  $-\text{Br}$  or  $-\text{I}$ ;  
and  $\text{X}'$  is  $\text{X}$ , as defined above;  
or  $\text{X}'$  is  $>\text{C}=\text{O}$ ;

41 where, in each formula set forth above, each  $\text{R}_1$  and  $\text{R}_2$   
42 independently is  $-\text{H}$ , or substituted or unsubstituted alkyl,  
43 alkenyl or alkynyl group of 1-6 carbons; and the bond  
44 indicated by  $\text{C}\bullet\bullet\bullet\text{C}$  is absent or, in combination with the  $\text{C}-\text{C}$   
45 bond is the unit  $\text{HC}=\text{CH}$ .

1  
2

12. A compound of the general formula below, said  
compound being a cell-mitosis-inhibiting compound:

3



4 wherein:

5 I.  $R_a-R_o$  are defined as follows:

6 A) each  $R_a, R_b, R_c, R_e, R_g, R_h, R_k, R_l, R_m, R_n,$   
 7  $R_o$  independently is  $-R_1, -OR_1, OCOR_1, -SR_1,$   
 8  $-F, -NHR_2, -Br, \text{ or } -I$ ; and  $R_i$  is  $-R_1, -OR_1,$   
 9  $-OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$  or  $-C\equiv CH$ ;

10 or

11 B) each  $R_a, R_e, R_l, R_m, R_n, R_o$  independently  
 12 is  $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$   
 13  $-I$ ; and each  $R_b, R_c, R_g, R_h$  is  $=O, -R_1,$   
 14  $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$  or  $-I$ ;  
 15 and  $R_i$  is  $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F,$   
 16  $-NHR_1, -Br, -I$  or  $-C\equiv CH$ ;

17 or

18 C) each  $R_a, R_b, R_c, R_e, R_k, R_m, R_n, R_o$   
 19 independently is  $-R_1, -OR_1, OCOR_1, -SR_1,$   
 20  $-F, -NHR_2, -Br, -I$ ; and each  $R_g, R_h$   
 21 independently is  $=O, -R_1, -OR_1, -OCOR_1,$   
 22  $-SR_1, -F, -NHR_1, -Br$  or  $-I$ ; and  $R_i$  is  $=O,$   
 23  $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$   
 24 or  $-C\equiv CH$ ;

25 and

26 II.  $Z$  is defined as follows:

27 A)  $Z$  is  $X$ , where  $X$  is  $>COR_1, >\overset{O}{\underset{|}{CC}}-R_1, >\overset{O}{\underset{|}{CC}}-OR_1,$   
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 29

30  $>\overset{OH}{\underset{|}{CC}}-R_1, >\overset{OH}{\underset{|}{CC}}-OR;$   
 31  
 32

33 or

34 B)  $Z$  is  $=\underset{\underset{R_p}{|}}{C}-X'-$  or  $-X'-\underset{\underset{R_p}{|}}{C}=$ , where  $R_p$   
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is  $-R_1$ ,  $-OR_1$ ,  $-SR_1$ ,  $-F$ ,  $-NHR_2$ ,  $-Br$  or  $-I$ ,  
and  $X'$  is  $X$ , as defined above;  
or  $X'$  is  $=O$ ;

where, in each formula set forth above, each  $R_1$  and  $R_2$   
independently is  $-H$ , or substituted or unsubstituted alkyl,  
alkenyl or alkynyl group of 1-6 carbons; and the bond  
indicated by  $C\cdots C$  is absent or, in combination with the  $C-C$   
bond is the unit  $HC=CH$ .

13. The method of claim 1, wherein said  
cell-mitosis-inhibiting composition is 2-methoxyestradiol.

14. The method of claim 1, wherein said  
cell-mitosis-inhibiting composition is 2-fluoroestradiol.

15. The method of claim 1, wherein said  
cell-mitosis-inhibiting composition is 2-bromoestradiol.

16. The method of claim 1, wherein said  
cell-mitosis-inhibiting composition is 2-methoxyestrone.

17. The method of claim 1, wherein said cell-  
mitosis-inhibiting composition is 17-ethynylestradiol.

18. The method of claims 1 or 2 wherein said  
compound is further characterized in that

A)  $Z'$  is  $\begin{array}{c} \text{=C-X'-} \\ | \\ R_n \end{array}$  or  $\begin{array}{c} \text{-X'-C=} \\ | \\ R_n \end{array}$ ; and

$Z''$  is  $\begin{array}{c} \text{-Y-CH-} \\ | \\ R_p \end{array}$  or  $\begin{array}{c} \text{-CH-Y-} \\ | \\ R_p \end{array}$ ; or

B)  $Z'$  is  $X$ ; and  $Z''$  is  $\begin{array}{c} \text{-Y-CH-} \\ | \\ R_p \end{array}$  or  $\begin{array}{c} \text{-CH-Y-} \\ | \\ R_p \end{array}$ ; or

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c) Z' is  $\begin{array}{c} =C-X'- \\ | \\ R_n \end{array}$  or  $\begin{array}{c} -X'-C= \\ | \\ R_n \end{array}$ ; and Z" is Y.

1 19. The method of claims 3 or 4 wherein said  
2 compound is further characterized in that Z is  
3  $\begin{array}{c} -Y-CH- \\ | \\ R_n \end{array}$  or  $\begin{array}{c} -CH-Y- \\ | \\ R_n \end{array}$ .  
4  
5

1 20. The method of claims 5 or 6 wherein said  
2 compound is further characterized in that Z is  
3  $\begin{array}{c} =C-X'- \\ | \\ R_p \end{array}$  or  $\begin{array}{c} -X'-C= \\ | \\ R_p \end{array}$ .  
4  
5

1 21. The compound of claims 7 or 8, wherein said  
2 compound is further characterized in that

3 A) Z' is  $\begin{array}{c} =C-X'- \\ | \\ R_n \end{array}$  or  $\begin{array}{c} -X'-C= \\ | \\ R_n \end{array}$ ; and  
4  
5

6 Z" is  $\begin{array}{c} -Y-CH- \\ | \\ R_p \end{array}$  or  $\begin{array}{c} -CH-Y- \\ | \\ R_p \end{array}$ ; or  
7  
8

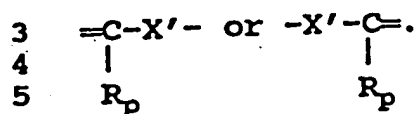
9 B) Z' is X; and Z" is  $\begin{array}{c} -Y-CH- \\ | \\ R_p \end{array}$  or  $\begin{array}{c} -CH-Y- \\ | \\ R_p \end{array}$ ; or  
10  
11

12 c) Z' is  $\begin{array}{c} =C-X'- \\ | \\ R_n \end{array}$  or  $\begin{array}{c} -X'-C= \\ | \\ R_n \end{array}$ ; and Z" is Y.  
13  
14

1 22. The compound of claims 9 or 10, wherein said  
2 compound is further characterized in that Z is  
3  $\begin{array}{c} -Y-CH- \\ | \\ R_n \end{array}$  or  $\begin{array}{c} -CH-Y- \\ | \\ R_n \end{array}$ .  
4  
5



1 23. The compound of claims 11 or 12, wherein said  
2 compound is further characterized in that Z is



1 24. The method of any one of claims 1-6, wherein at  
2 least one of  $\text{R}_a \rightarrow \text{R}_p$  is  $-\text{OCH}_3$ .

1 25. The compound of any one of claims 7-12, wherein  
2 at least one of  $\text{R}_a \rightarrow \text{R}_p$  is  $-\text{OCH}_3$ .

Add  
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